

VNECA Presentation
Second Round of Funding for GEM*STAR
(Proton*Power) \$19 million

from

ADNA Corporation

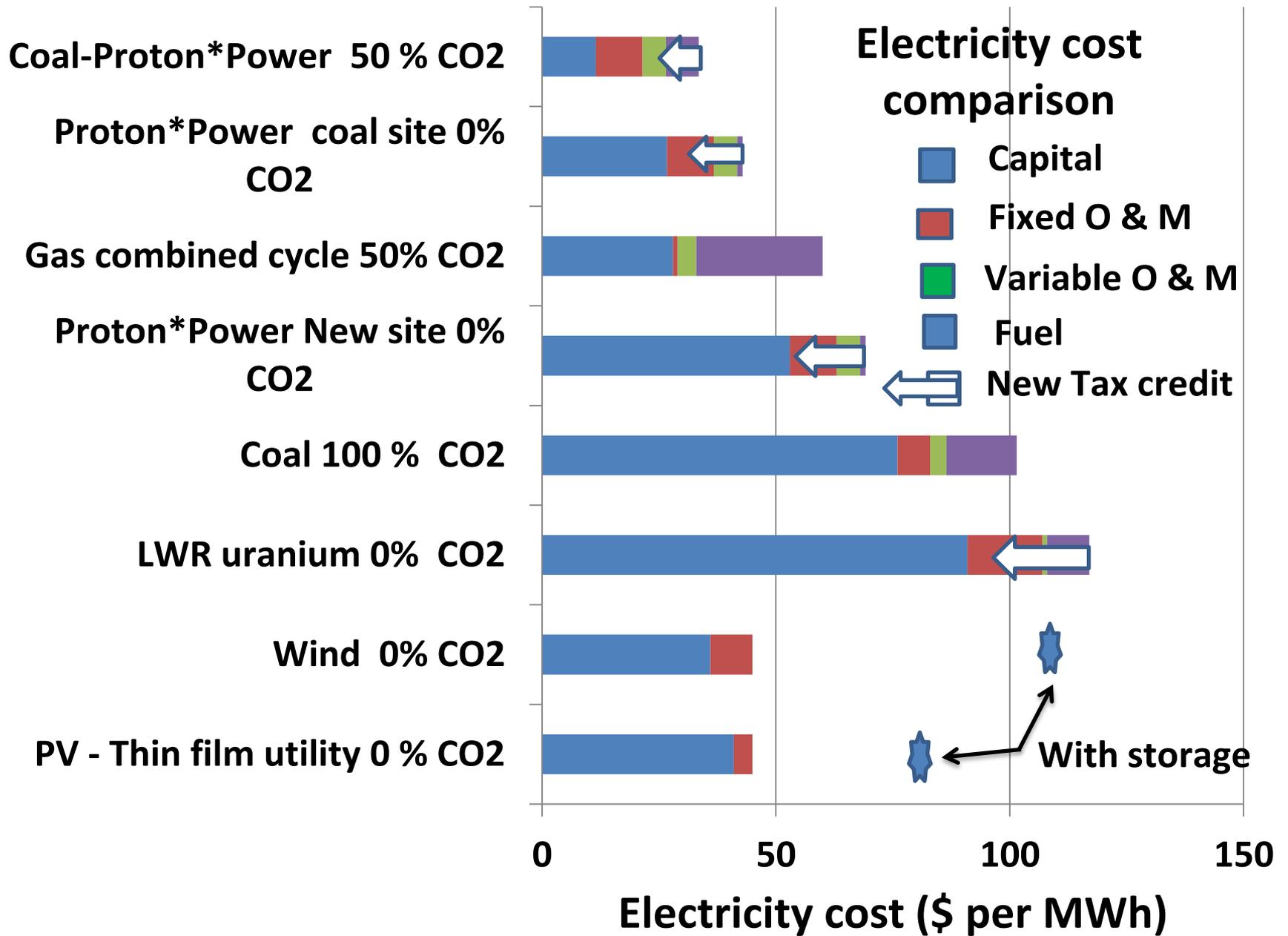
Accelerator Driven Neutron Applications

Presented by

Charles D. Bowman, Ph. D. and Ganapati Myneni Ph. D.

March 20, 2018

Richmond, VA



GEM*STAR Burns W-Pu Without U or Th

34 Tons in 30 Years

Hourly fill:

30 g W-Pu
as PuF_3 +
carrier salt

Inflow W-Pu:

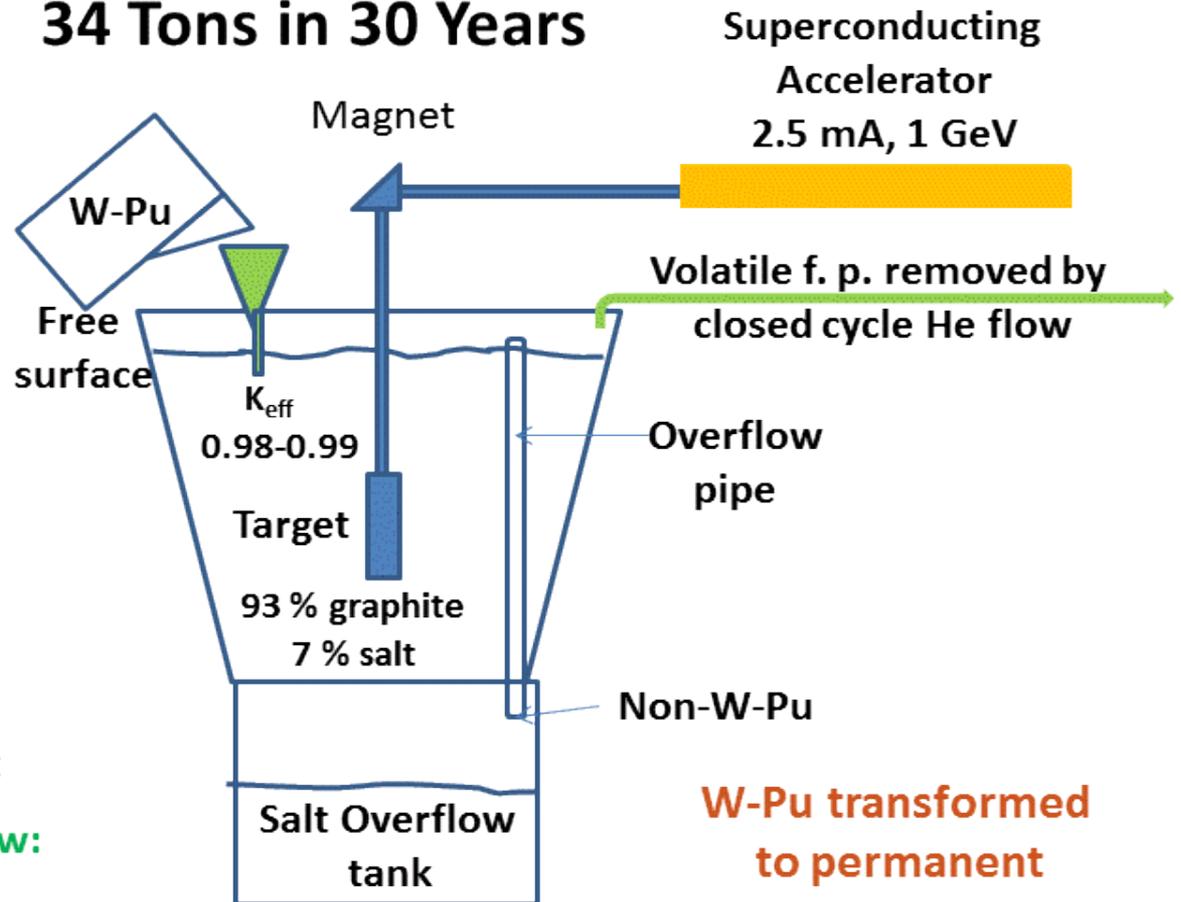
93 % ^{239}Pu
7 % ^{240}Pu

Hourly overflow:

7.5 g as PuF_3 +
carrier salt +
22.5 g of fission product

Non-weapons Pu Outflow:

52.4 % ^{239}Pu
25.4 % ^{240}Pu
10.6 % ^{241}Pu
11.7 % ^{242}Pu



Superconducting
Accelerator
2.5 mA, 1 GeV

Volatile f. p. removed by
closed cycle He flow

Overflow
pipe

Non-W-Pu

Salt Overflow
tank

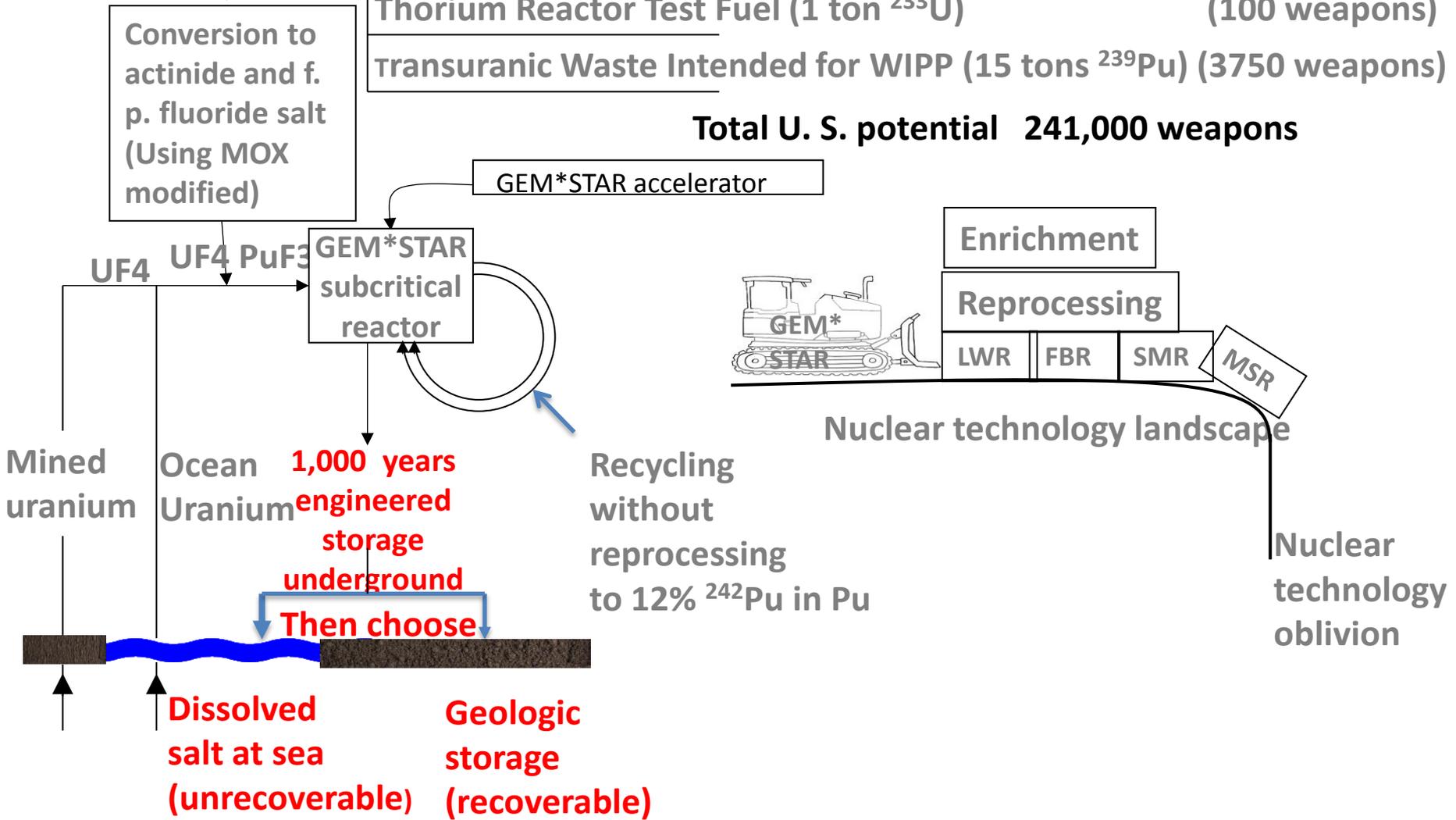
Fission power 500 MWt
Requires four units like this
driven by one 10 mA accelerator

W-Pu transformed
to permanent
non-weapons Pu
immediately upon
adding and mixing

Eliminating Weapons-Useful Pu Using GEM*STAR

Excess W-Pu (90 tons ^{239}Pu)	(22,500 weapons)
Reactor Spent Fuel 80,000 tons (800 tons of Pu)	(200,000 weapons)
Naval Reactor Spent Fuel (150 tons ^{235}U)	(15,000 weapons)
Thorium Reactor Test Fuel (1 ton ^{233}U)	(100 weapons)
transuranic Waste Intended for WIPP (15 tons ^{239}Pu)	(3750 weapons)

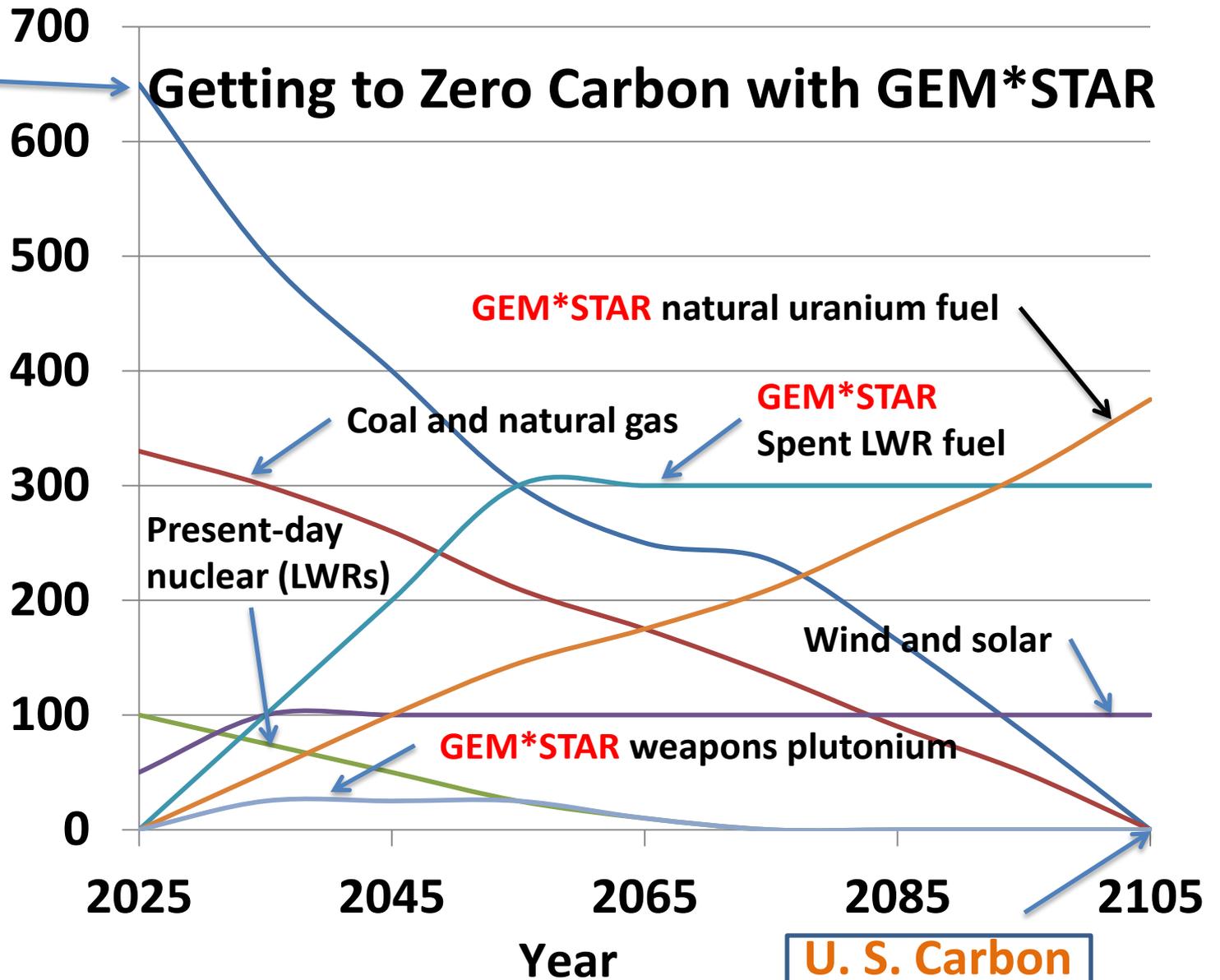
Total U. S. potential 241,000 weapons



Nuclear technology oblivion

**U. S. carbon
Emissions
65 %**

U. S. Gigawatt electric



**U. S. Carbon
Emissions
0 %**

Integration by 2020 Towards GEM*STAR Demo in 2023

Funding for 2018 - 2020

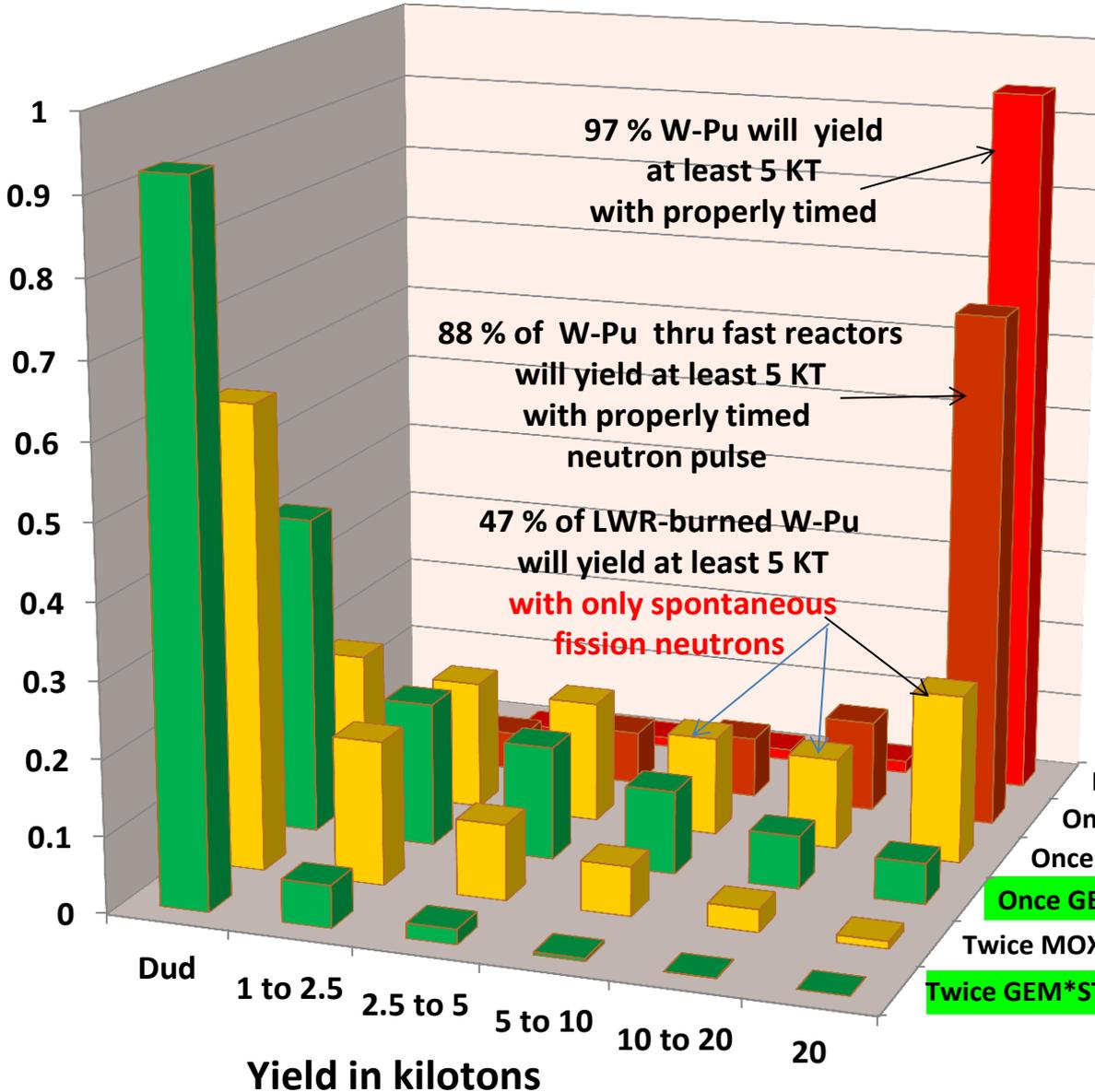
Molten Salt	\$3
Sales of salt for molten salt for reactors	
Wood-to-Charcoal-to-diesel (BCLF)	1
Sale of non-nuclear activated charcoal	
⁷ Li enrichment	3
Sale of ⁷ Li to today's reactors for chem. balance	
Accelerator technology	3
Accelerator collaboration with EU	
GEM*STAR design	<u>9</u>
Construction plans for subcritical facility	
	Total
	\$19 million

Final GEM*STAR demo needs \$350 million in 2020 (\$70 million private and 280 million SBA loan)



Spontaneous Fission Neutron Impact on Yield Probability

Implosion speed
twice Trinity
3 kg W-Pu



- No burning 34 tons (3 kg)
- Once through FBR 39 tons (4.14...)
- Once MOX in LWR 37.5 tons (5.24...)
- Once GEM*STAR 10 tons (8.5 kg)
- Twice MOX in LWR 40 tons (10 kg)
- Twice GEM*STAR 3.4 tons (15.6...)